General Specifications

Model NTPC020
Exaquantum Down Time Analysis

Exaquantum

GS 36J40C10-01EN

■ PROBLEM

Planned production is often compromised by unplanned Downtime incidents and sub-optimal production rates that are not quantified in terms of Time, Rate Loss and the associated Reasons. Without this quantifiable information there is no way to consistently identify potential Downtime causes and to assign activities to make the necessary improvements avoiding future lost production.

■ SOLUTION

Exaquantum Down Time Analysis (Exaquantum/DTA; hereafter referred to as 'DTA') is Yokogawa's solution.

Based on the need to log and track unplanned equipment Downtime, DTA automatically captures plant data to enable Downtime analysis to be carried out.
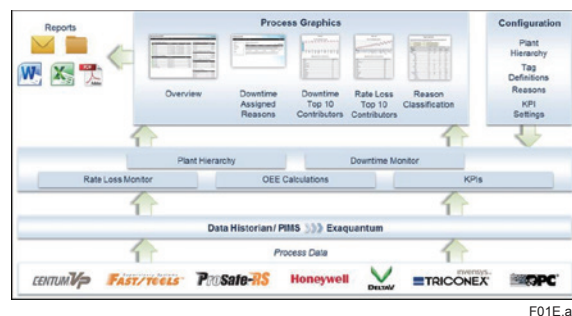
The system records times when plant equipment is not running ('Downtimes') and production figures which are less than the Maximum Sustainable Production Rate ('Rate Losses'). Reasons can then be assigned to these events to add context. The resulting statistics are integral to the operational decision making process with a view to minimizing plant loss and maximizing future production.

■ BENEFITS

- Continuous plant availability improvement through increased awareness of Downtime and Rate Loss within the operating process and equipment dynamics
- Prioritized maintenance by identifying the causes and effects of Production Loss
- Shared best practices between plant Production Units to reduce potential Downtime
- Inaccuracies removed through automated data collection, verified and enhanced with manual input to provide accurate information for improved decision making
- Detailed standard reports plus the ability to create custom reports allowing information to be exposed that is normally not available
- Reports are available on demand or scheduled as required. Distribution via email is supported making information available in a timely fashion to decision makers
- Access to Downtime and Rate Loss information is provided via a web interface.

■ KEY FEATURES

- Downtime Loss (Hours) is continuously collected and registered for each Plant Unit
- Rate Loss is calculated and registered on a daily basis for each Plant Unit at the end of each production day
- Rate Losses can be translated into equivalent Downtime Losses and vice versa.

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■ INTRODUCTION

A Plant will have one or more Production Units that are expected to be in constant production. Any interruption to production is considered Downtime, with an associated Loss.

Downtime Loss is automatically collected and registered in DTA on a per-Unit basis. Downtime Loss is a measure of production loss when a Production Unit is Down, measured in time.

Rate Loss is a measure of production loss when the Production Unit is Up, calculated in Units/Hour. Rate Loss is the loss of production due to sub-optimal operating conditions.

Standby is a measure of the time a piece of equipment is ready to run but is prevented from doing so by another piece of equipment being Down. The collection of standby data is optional and is available for collection on any equipment within the plant hierarchy.

Downtime Loss (Hours) can be translated into an equivalent Units/H, and Rate Loss (Units/H) can be translated into Hours allowing total loss to be represented by either Hours or Units/H.

Plant and Reason hierarchies are used for both selection, aggregation and reporting purposes.

■ CAPABILITIES

Assignment of Downtime and Rate Loss Reasons
Short description of the capability. If required the following bullet point format can be used to list items:

The assignment of Reasons to Losses can be made by one or more users.

There may be multiple Reasons associated with each Downtime occurrence and therefore the ability to weight Reasons is provided. For example, Reason A may be responsible for 60% of the Downtime and Reason B responsible for 40% of the Downtime. The weighting can be entered as either a percentage of the total Downtime or an actual time duration. If a day boundary is crossed these weightings will get allocated pro-rata for each day.

To aid in the allocation of Reasons to Downtimes, a record of the 'First Out Stop' equipment and cause may be collected and linked to the Downtime event.

There may be multiple Reasons associated with each Rate Loss occurrence and therefore the ability to assign percentage allocations to each Reason is provided. For example, Reason A may be responsible for 20% of the material loss and Reason B responsible for 80% of the material loss.

Web User Interface
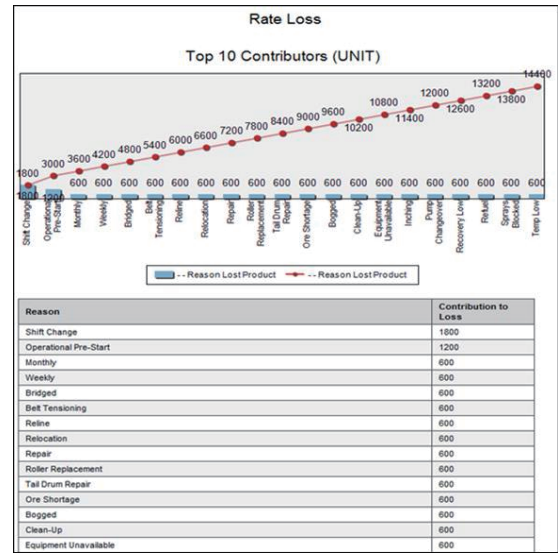Web based access means there is no need for specific client software installation.

An Overview Screen provides a summary of the:
• Latest Downtime Events
• Latest Rate Loss Events
• Availability KPI for the last 30 days
• Downtime KPI for the last 30 days
• Rate Loss KPI for the last 30 days

In addition, custom KPI's can be engineered and added to the overview screen and summary reports.

Rate Loss
The Rate Loss Events are presented as a user selectable filtered view with additional drilldown for detailed information. Selecting a Rate Loss Event provides the user with the details of the event along with associated Reasons. Multiple Rate Loss Reasons can be assigned and edited for a Rate Loss event.

Reason	Contribution to Loss
Shift Change	1800
Operational Pre-Start	1200
Monthly	600
Weekly	600
Bridged	600
Belt Tensioning	600
Reline	600
Relocation	600
Repair	600
Roller Replacement	600
Tail Drum Repair	600
Ore Shortage	600
Bogged	600
Clean-Up	600
Equipment Unavailable	600

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Downtime Events
The Downtime Events are presented as a selectable filtered view with additional drilldown for detailed information. Selecting a Downtime Event provides further details and any assigned Reasons.

Multiple Downtime Reasons can be assigned to a Downtime Event. The PCS Stop cause and PCS Stop equipment, if configured for collection, can also be viewed.

Reason	Contribution to Loss
unassigned	198.5
Overrun	2.8
Level Indicator Fault	2.7
Temp Low	2.7
Equipment Unutilised	2.5
Operational Pre-Start	2.5
Pre-Start	2.5
Toolbox meeting	2.5
Pad Rebuild	2.3
Sprays Blocked	2.3
COS Access Reqd	2.2
Belt Tensioning	2.2
Equipment Failure	2.2
Flow meter	2.2
Torque indication	2.2
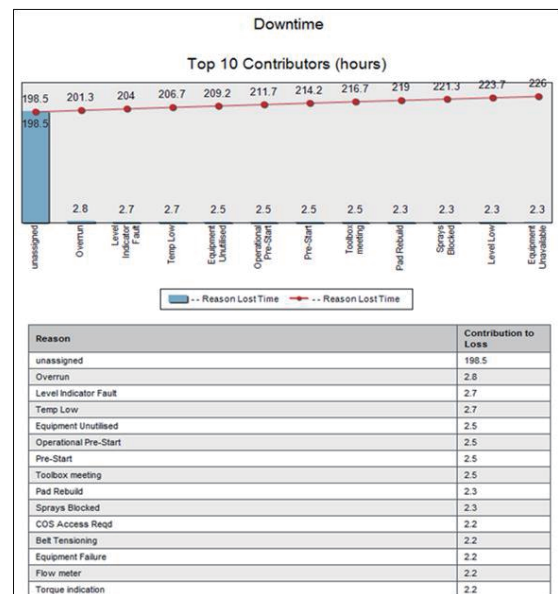
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Process Unit Summary Report

Downtime, Rate Loss and Total Availability for a requested period are aggregated up through the units of the Plant Hierarchy. The Summary Report is able to show this information against the expanded Plant Hierarchy.

Selection of any Plant Hierarchy node generates a Reason Classification Report for the selected node and period of interest. This allows users to explore detailed information using drilldown through different time periods, Plant Hierarchy and Reason Hierarchy to identify cases that are the most deserving of corrective action:

Downtime and Rate Loss Ranking Reports

The Downtime Equipment Ranking and Rate Loss Equipment Ranking Reports split ranking down into combinations of equipment and allocated reason.

From the Downtime, Rate Loss, Downtime Equipment, or Rate Loss Equipment Ranking reports further drilldown is possible to a detailed event report, showing the individual Downtime and Rate Loss events that contributed to the totals in the ranking report.

Reason Classification Report

The Downtime and Rate Loss associated with Reasons are aggregated up through the nodes of the Reason Hierarchy. The Reason Classification Report displays this information against the expanded Reason Hierarchy.

From the Reason Classification Report, four more reports can be drilled down to; Downtime Ranking, Rate Loss Ranking, Downtime Equipment Ranking, and Rate Loss Equipment Ranking, with worst offending Reasons listed in contribution order.

Reason Classification

Downtime and Rate Shortfall losses are mapped to Reason. Both loss types are represented together as Time in hours and Product loss in (UNIT). The Reason Hierarchy maps Reason Detail to Reason, Responsible, and Linked Plant. Select a box below to navigate to Ranking Reports.

Downtime Ranking	Downtime Equipment Ranking
Rate Loss Ranking	Rate Loss Equipment Ranking

Reason Hierarchy:- Reason Set -- Responsible ---- Reason Group ------Reason	Downtime (hours)	Rate Loss (UNIT)	Production Loss As Time (hours)	Production Loss As Production (UNIT)
⊟ AMP	198.33	14400	212.73	212733.33
⊟ Maint_Planned	16.93	1200	18.13	18133.33
⊟ Electrical	5.1		5.1	5100
Daily	.5		.5	500
Weekly	1.43		1.43	1433.33
Monthly	1.5		1.5	1500
Other	1.67		1.67	1666.67
⊟ Mechanical	6.33	600	6.93	6933.33
Daily	1.5		1.5	1500
Weekly	1.33		1.33	1333.33
Monthly	1.83	600	2.43	2433.33
Other	1.67		1.67	1666.67
⊟ Instrument	5.5	600	6.1	6100
Daily	1		1	1000
Weekly	1.17	600	1.77	1766.67
Monthly	1.17		1.17	1166.67
Other	2.17		2.17	2166.67
⊟ Maint_Unplanned	49.17	4200	53.37	53366.67
⊟ Electrical	14.33	600	14.93	14933.33
DCS fault	1.5		1.5	1500
Drive Train	1.17		1.17	1166.67
Excitor Faulty	1.33		1.33	1333.33
Gland Flow Low	1.33		1.33	1333.33
Level Indicator Fault	2.67		2.67	2666.67

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Custom Reports

Exaquantum/DTA's Downtime and Rate Loss data and any assigned Reason data can be accessed from Microsoft Excel. Administrators can also create new reports in SQL Server Report Builder to supplement the standard reports. Administrator created Custom reports can be scheduled for emailing.

OPC DA and HDA Client Interfaces

Exaquantum/DTA collects production data from OPC DA 2.05a and HDA 1.1 servers, such as Yokogawa's 'Exaopc' or OPC servers provided by other suppliers.
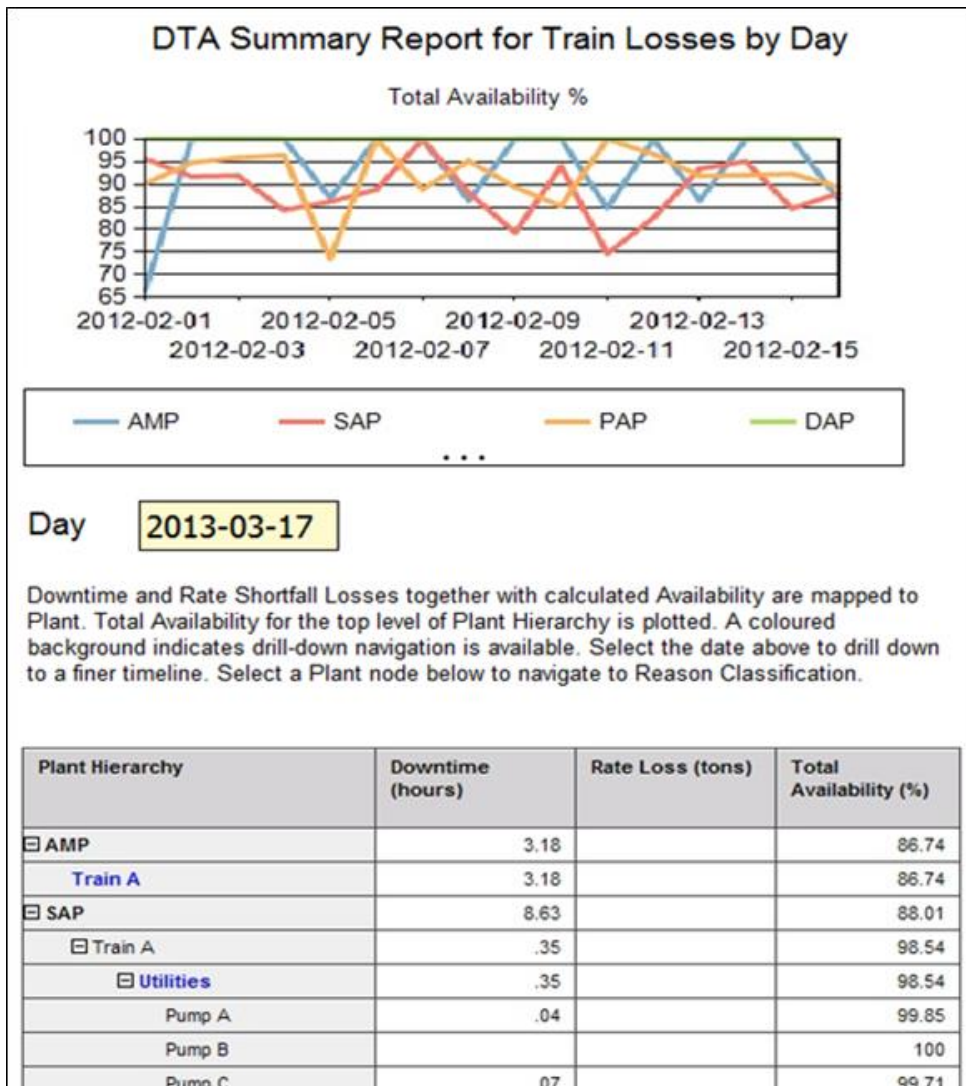
Operational Benefits

Exaquantum/DTA can provide a number of operational benefits, including:

- Productivity improvement initiatives by comparing plant production lines and shifts
- Exposing areas of concern in the operational health of different parts of the plant
- Improving operations by setting appropriate targets or priorities
- Consolidated view of Downtime occurrence relationships
- Historical information access allowing comparison with past plant performance allowing judgments to be made on the effectiveness of upgrades.

Business Benefits

Exaquantum/DTA can provide a number of business benefits, including:

- Increased production and asset utilization
- Improved planning and scheduling
- Reduced delivery times to customers
- A culture of continuous improvement based upon an effective and formalized Downtime Analysis and Reporting System.

DTA Summary Report for Train Losses by Day

Total Availability %

Day 2013-03-17

Downtime and Rate Shortfall Losses together with calculated Availability are mapped to Plant. Total Availability for the top level of Plant Hierarchy is plotted. A coloured background indicates drill-down navigation is available. Select the date above to drill down to a finer timeline. Select a Plant node below to navigate to Reason Classification.

Plant Hierarchy	Downtime (hours)	Rate Loss (tons)	Total Availability (%)
⊟ AMP	3.18		86.74
Train A	3.18		86.74
⊟ SAP	8.63		88.01
⊟ Train A	.35		98.54
⊟ Utilities	.35		98.54
Pump A	.04		99.85
Pump B			100
Pump C	.07		99.71

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■ HARDWARE AND SOFTWARE REQUIREMENTS

Minimum Hardware and Software Specifications

Component	Minimum Hardware Specifications
Exaquantum/DTA Server	As listed in the Exaquantum R2.85 GS 36J04A10-01E for an Exaquantum Server
Exaquantum/DTA Web Server	As listed in the Exaquantum R2.85 GS 36J04A10-01E for an Exaquantum Web Server
Exaquantum/DTA Web Clients	As listed in the Exaquantum R2.85 GS 36J04A10-01E for an Exaquantum Web Client

Component	Software Specifications
Exaquantum/DTA Server	As listed in the Exaquantum R2.85 GS 36J04A10-01E for an Exaquantum Server
Exaquantum/DTA Web Server	As listed in the Exaquantum R2.85 GS 36J04A10-01E for an Exaquantum Web Server
Exaquantum/DTA Web Clients	As listed in the Exaquantum R2.85 GS 36J04A10-01E for an Exaquantum/Web Client

■ MODELS AND SUFFIX CODES

Exaquantum/DTA Product

		Description
Model	NTPC020	Exaquantum/DTA Product
Suffix Codes	-S	Basic Software License
	1	New Order (with Media)
	1	English version
	-SV☐	Enter the number of Exaquantum/DTA Server Licenses (1 - 9)
	-WC☐	Enter the number of per-seat Exaquantum/DTA Web Client Licenses (1 - 9)

Maintenance Service for Exaquantum/DTA

		Description
Model	NTMC020	Maintenance Service for Exaquantum/DTA
Suffix Codes	-S	Annual Contract
	1	Always 1
	1	Always 1
	-SV☐	Enter the number of Exaquantum/DTA Server Licenses (1 - 9)
	-WC☐	Enter the number of New per-seat Exaquantum/DTA Web Client Licenses (1 - 9)

■ ORDERING INFORMATION

Specify model and suffix codes.

■ TRADEMARKS

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